

BOWLING (W-K.)

KATY DID, AND KATY DIDN'T.

AN INQUIRY CONCERNING

PRIORITY IN THE LIGATION OF

THE INTERNAL CAROTID ARTERY.

BY WILLIAM K. BOWLING, M. D.,

EMERITUS PROFESSOR OF THE THEORY AND PRACTICE OF MEDICINE,

In the Medical Department of the University of Nashville.

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NASHVILLE, TENNESSEE:

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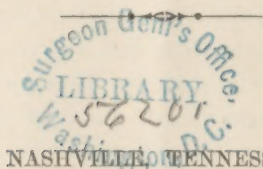
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Presented by
PRIORITY IN THE LIGATION OF *J.B. Hunter*

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DR. GROSS, in his biography of McDowell, says that his hero liked to refer to Surgery as the "certain part of Medicine," and yet great surgeons not unfrequently, under the chagrin and mortification of defeat, exclaim, "the glorious uncertainty of Surgery!" We have often said that we were thankful we were no surgeon, and yet, had we shone with a steady brightness in that profession, we might have been more thankful still that we were a member of it. While a physician only, we have, since early manhood, had a passion for Surgery, and watched its progress with an interest not surpassed by that of our contemporaries who illustrate and adorn it. We have said it is uncertain, but so are most of the efforts of man, as well, indeed, as man himself; so what is common to all things, cannot be logically urged as an objection to any one thing. It must, therefore, be conceded, that Surgery *is* uncertain; and it will not be successfully denied that, for this very reason, its brilliant successes should not only be faithfully recorded, but that its votaries should feel that it was impera-

tively demanded of them, at least, that they should be familiar with the record.

The great libraries contain a collection of all medical publications, flowing through legitimate channels, from that which humbly trickles down the mountain side, mirroring the daisy and offering drink to the bonnie lark, to that which rolls its interminable length along the lowland plain, refreshing cities and villages and hamlets, embosoming half the sky, and carpeting with green a landscape bounded in every direction by the horizon. The rill and the Amazon alike find their way to the ocean; so likewise a medical journal from the wilderness of trees and cascades, enlivened by singing birds and frisking squirrels, and made awfully grand by armies of buffalo, in stately and silent march to "the springs," find ultimate companionship with that from a wilderness of chimneys and masts and streets and wheels and people, in a common library. Search, and ye shall find, is the law here as elsewhere.

We do not wish to be understood as reflecting injuriously upon the publication of any one, but desire only to assert that it is the bounden duty of medical authors, as well as of authors in general, before going forward with any inquiry, to be assured of the thoroughness of their research in the past, before they add a new chapter; and the importance, as well as the reasonableness of this rule, addresses itself the more forcibly to our understanding in a surgical inquiry, where a seemingly slight omission of a fact may rob a surgeon of a large part of his wealth, the whole of which oftentimes consisting alone in his truthfully-recorded achievements.

We were not a little surprised, the other day, upon reading, in the *New York Medical Journal*, an account of the ligation of the internal carotid artery. All surgeons know that it requires the highest order of skill, as well as all the minor qualities of a great surgeon, of which skill is a culmination, to successfully deal with a hemorrhage of which the internal carotid artery is the *fons et origo*. Now, as we desire to ventilate the inquiry as to who has done this thing—who has thus added his name on the scroll of fame to the very few it can

exhibit upon this subject, we shall quote the entire case from the *New York Medical Journal* to begin with :

A Case of Hemorrhage from the Internal Carotid Artery treated successfully by the Ligature. By H. B. SANDS, M. D., Surgeon to the Bellevue and the Roosevelt Hospitals, etc.

The following case is believed to be unique, and to constitute an important contribution to the annals of operative surgery :

On October 22, 1872, I performed disarticulation of the left half of the lower jaw, on account of a malignant scirrhus tumor, occurring in a gentleman, fifty-three years of age, and developed chiefly on the inner aspect of the ramus and body of the bone, near the angle. The usual incision having been made, the jaw was divided on the left of the median line, through the socket of the corresponding canine tooth. The bone was then forcibly everted, while I quickly severed, by means of a pair of stout scissors, the soft parts covering the internal surface of the tumor, and then completed the disarticulation. Copious arterial hemorrhage, checked temporarily by the pressure of the left fore-finger, attended this manœuvre, and, on subsequent examination of the tumor, there were found running through it an inch of the trunk of the external carotid artery, and portions of about equal length of the digastric muscle and the hypoglossal nerve. These parts were necessarily divided and removed, together with the tumor. The external carotid, together with some smaller arterial vessels, having been tied, I was about to close the wound, when free venous bleeding took place from a small opening that I had accidentally made in the internal jugular vein. After some reflection as to the best course to pursue, I seized the margins of the wound in the vein, and applied a lateral ligature, not occluding the calibre of the vessel. The wound was then closed by sutures, except at its middle part, where an opening, half an inch long, was left for the exit of the ligatures. During the operation, it was noticed that the upper part of the common carotid, and the internal carotid artery, from its origin to the base of the skull, were exposed, and could be seen pulsating at the bottom of the wound.

On the tenth day after the operation, at ten o'clock in the evening, while my partner, Dr. Curtis, was engaged in cleaning the wound, a sudden escape of blood took place, both from the external opening and through the mouth. Dr. Curtis at once compressed the common carotid with the left hand, and, ripping open the upper end of the original incision, passed in two fingers of the right hand, and made pressure over the line of the internal carotid. The hemorrhage ceased at once, about two ounces of blood having been lost, whose color gave no certain indication of the source of the bleeding. Pressure was successfully maintained until my arrival, at the

end of about half an hour. It was then found that one of the upper two fingers covered the bleeding point, which was evidently above the carotid bifurcation, and Dr. Curtis was relieved by my pupil, Mr. Shafter. The ligatures were then examined, and that on the internal jugular vein identified and found to be attached far below the bleeding point. No ligature could be identified as belonging to the external carotid artery. After looking at the ligatures, I, without giving ether, prolonged the opening in the neck downward along the anterior edge of the sterno-mastoid muscle, and endeavored to reach the common carotid high up. Owing to the altered condition of the parts, this proved impracticable; so, having divided the omo-hyoid muscle, I exposed the artery just below it, where the tissues were normal, and passed, without tightening it, a ligature.

The common carotid was then compressed between the ligature and the finger, and pressure relaxed upon the bleeding point. A very vigorous spurt of blood followed, and pressure was resumed.

An examination of the surface, immediately above the seat of hemorrhage, revealed a very soft pulsation, just beneath the granulations along the line of the internal carotid. The latter vessel I directed Dr. Curtis to dissect, while I controlled the bleeding. The internal carotid was exposed by scratching through the condensed tissues with the point of a grooved steel director; a ligature was passed, and was immediately tightened, as was just afterward the one encircling the common carotid. I then lifted my finger from the bleeding point, and no gush followed, but a bleeding continuous in character, and small in amount. This was easily controlled by pressure just below the opening, and for the first time the exact seat and nature of the latter were completely open to inspection.

The blood was found to come from a small, circular, clean-cut ulceration in the side of the internal carotid artery, situated an inch below the upper ligature, and the same distance above the upper border of the thyroid cartilage. Through this opening the white and glistening surface of the inner coat of the opposite side of the arterial wall was distinctly visible. After ascertaining the opening to be in the side of the internal carotid, I readily exposed this vessel two or three lines below the opening, and applied a ligature, thus cutting off the source of the trifling hemorrhage which had persisted after the tightening of the first two ligatures. This hemorrhage must have been caused by the recurrent circulation through branches springing from the stump of the external carotid. The lower portion of the wound was then closed by a few silk sutures, and the rest lightly filled with dry lint.

The operation, which lasted about two hours, was wonderfully well borne, the patient making no complaint. He lost altogether, both during the operation and the antecedent hemorrhage, not more than four or five ounces of blood, and the pulse continued firm throughout. Milk and iced brandy were administered through the night, and the patient obtained sleep without anodynes.

The subsequent progress of the case was eminently satisfactory. The two ligatures on the internal carotid separated on the ninth day, that of the common carotid on the fourteenth day, and that of the internal jugular vein on the seventeenth day, after their application. The upper ligature on the internal carotid had, in its noose, an offensive white slough of the artery, three-eighths of an inch long, and another hemorrhage was feared. None occurred, however, and the patient recovered completely without any further unpleasant symptoms.

Remarks.—Lesions of the internal carotid are usually so rapidly fatal, that no opportunity is afforded for surgical treatment. But, even when the surgeon interferes, success is not generally attainable, and, so far as I have been able to ascertain, there is only one other example of recovery recorded besides the one herewith reported. This case occurred in 1807, in the practice of Dr. Twitchell, of Keene, New Hampshire, and, in many respects, it resembled my own. The hemorrhage was secondary, and took place, ten days after a gunshot injury, while Dr. Twitchell was in the patient's house. He applied a ligature on the cardiac side of the opening in the wall of the internal carotid,* but was obliged to check the recurrent hemorrhage by means of a graduated compress, as the opening was in that part of the artery which lies just beneath the base of the skull.

From various sources, I have collected the following instances of hemorrhage from the internal carotid. Some were treated, and others were not, while all terminated fatally:

1. A hunter received a penetrating bullet-wound in the face. Hemorrhage occurred on the third day, after the administration of an emetic. Death took place on the fourth day, during an attempt to tie the common carotid. At the autopsy, the ball was found lying behind this vessel, opposite the bifurcation. The internal carotid showed a longitudinal rent one-fourth of an inch in length.

2. Abernethy tied the common carotid for hemorrhage from a wound of the neck inflicted by a cow's horn. The patient died thirty hours after the operation, with symptoms of hemiplegia. At the *post-mortem* operation, the facial, lingual, superior thyroid, and internal carotid arteries, were found torn.

3. Langenbeck tied the common carotid for hemorrhage from the internal carotid, caused by the ulceration of an epithelial cancer. Death occurred soon after the operation, and an ulcer, not larger than the head of a pin, was found in the coats of the internal carotid.

* "He applied," says Dr. Sands, "a ligature on the cardiac side of the opening in the wall of the internal carotid." Of course the reader is led to believe, especially as ligature of the internal carotid is the subject being discussed, that Dr. Twitchell tied that artery. But the Doctor himself says he did not. He says: "I made an incision downwards to more than an inch below the point where the external branch was given off. * * * Passing my finger under it, I raised it up sufficiently for my assistant to pass a ligature around it. She tied it with a surgeon's knot, as I directed, about half an inch BELOW THE BIFURCATION."—See Twitchell, as quoted by Guthrie.—ED.

4. A. Smith ligated the common carotid for hemorrhage from the internal carotid, caused by a phagedenic ulcer of the tonsil. The patient died in six hours.

5. In the "Medical and Surgical History of the War of the Rebellion," a case is reported in which the common carotid was tied for hemorrhage from the internal carotid, caused by a gunshot wound. The hemorrhage recurred, and carried off the patient.

6. Baizeau tied the common carotid for hemorrhage from the internal carotid, caused by disease of the ear. The bleeding was not arrested, and proved fatal on the third day. At the autopsy, an opening was found in the internal carotid, produced by caries of the walls of the tympanum.

7. Broca performed an operation, like the one last described, and with a fatal result due to hemorrhage.

8. Billroth, in a case of hemorrhage from the right ear, due to ulceration of the internal carotid, tied the right common carotid, and, a fortnight subsequently, the left common carotid. Death from hemorrhage occurred two days after the last operation.

9. Dupuytren reports the case of a man who received a perforating bullet wound of the neck, at the level of the inferior maxilla. Hemorrhage, which pressure failed to arrest, occurred on the tenth day, and proved fatal on the twelfth day. At the autopsy, a wound, one-half an inch in length, was discovered in the internal carotid, two inches above its point of origin.

10. Heyfelder relates that a soldier received a penetrating wound of the left side of the neck, and died of hemorrhage eight hours after the injury. Ice-bags were the only means employed to check the bleeding. The internal carotid was found to be almost completely divided, three and a half lines above its origin.

11. Beclard states that a traveling charlatan wounded the internal carotid while attempting to excise an enlarged tonsil. The operator fled, and Beclard was summoned just in time to see the patient die from hemorrhage. A wound of the internal carotid was found *post mortem*.

In some of the cases above mentioned, namely, those in which the hemorrhage was due to disease of the petrous bone, the application of a ligature on the distal side of the arterial lesion was impossible, and the case that I have reported is the only one, so far as I am aware, in which a lesion of the internal carotid has been treated by the application of a double ligature to the injured vessel, one on the proximal and the other on the distal side of the bleeding-point.

The result affords additional evidence of the soundness of the rule laid down by Mr. Guthrie—a rule which is too often neglected, as is shown by the surgical reports of the late civil war, even at the present day. It is not, perhaps, difficult to explain why a surgical maxim, so generally admitted to be binding, should be so often disregarded. The application of a double ligature to the bleeding vessel is simple in principle, but generally

difficult, and sometimes impossible, in practice. The deep situation of the bleeding vessel, its relation to other important parts, and, in cases of secondary hemorrhage, the infiltration of the surrounding textures with inflammatory products, offer serious, and sometimes insuperable obstacles to the application of a double ligature near the opening in the arterial walls. In these circumstances, the temptation to apply a simple ligature to the main trunk is very great, and experience shows that this operation, either alone, or, as in Dr. Twitchell's case, in conjunction with pressure, may sometimes insure the desired result. Yet success in such an operation can never be expected, and the surgeon should in no case perform it except as a last resort, and after an attempt has been fairly made to apply a double ligature according to the rule admitted, by nearly every surgical writer, as imperative.

* In the present case it is plainly evident that, unless the ligature had been applied above as well as below the bleeding-point, death from hemorrhage would have rapidly and inevitably followed, as it was noticed that the simple interruption of the circulation through the common carotid produced no appreciable diminution in the violence of the bleeding, which, however, ceased almost entirely, when a ligature was applied to the internal carotid beneath the base of the skull. The slight recurrent hemorrhage still going on was controlled by the third ligature, placed just below the bleeding-point. This ligature I should have applied at first, instead of tying the primitive carotid, had the state of the parts rendered the requisite dissection practicable.

Finally, it may be interesting to note the success which attended the application of a lateral ligature to the internal jugular vein. In spite of the weight of authority in favor of treating wounds of large veins by the use of a double ligature, completely surrounding the vein above and below the bleeding-point, I am strongly inclined, if the wound be small, to trust to a single ligature, applied laterally, so as to include merely the edges of the wound, and not to interrupt the current of blood through the injured vessel. In case the wound were of large size, however, I should then regard the complete ligature of the vein as affording the best guarantee of success.

Mr. Guthrie, on the ligation of the internal carotid artery, says:

The inutility of tying the primitive trunk for a wound of the internal carotid is distinctly shown in this case, which is no less valuable from the fact demonstrated, that if the internal carotid can be exposed and injured within the angle of the jaw by an accident, it can be exposed and secured by ligature at the same part by an operation.

When, then, the internal carotid is wounded through the mouth, what operation is to be performed? That of placing a ligature above, and an-

other below the opening made into it; and after much consideration, and many trials, the following operative process is recommended to the attention of those who are best acquainted with the subject:

An incision is to be begun opposite to and on the outside of the extremity of the lobe of the ear, and carried downward in a straight line, until it reaches a little below the angle of the jaw, at the distance of nearly half an inch, more or less, as may be found most convenient from the form of the neck. This incision exposes the parotid gland without injuring it. A second is then to be made from the extremity of the first, extending at a right angle forward, under or along the base of the lower jaw, until the end of it is opposite the first molar tooth. This incision should divide the skin, superficial fascia, platysma myoides muscle, and the facial artery and vein. The second molar tooth should then be removed, and the jaw sawn through at that part. Then cut through the deep fascia, the mydo-hyoides muscle, and the mucous membrane of the floor of the mouth, exposing the insertion of the internal pterygoid muscle, which is to be divided. The surgeon will next be able to raise and partially evert the angle of the jaw, and thus obtain room for the performance of the remaining part of the operation, which should be effected by the pointed but blunt end of a scalpel, or other instrument chosen for the purpose of separating, but not of cutting. The styloid process of the temporal bone may then be readily felt, and exposed by the separation of a little cellular membrane, and with it the stylo-hyoid muscle, which is to be carefully raised and divided. The external carotid artery will thus be brought into view, together with the stylo-pharyngeus muscle and the glosso-pharyngeal nerve attached to it. These are to be drawn inward by a blunt hook, when, if care be taken to avoid the pneumogastric nerve, the internal carotid may be felt, seen, and secured by ligature with comparative facility outside the tonsil, there being between them the superior constrictor of the pharynx, which, in a case of wound through the mouth, must have been divided. The pneumogastric nerve should be drawn outward, and the external carotid artery also, if in the way. The division of the jaw will not lead to further inconvenience, as the bone always reunites, when divided, with little difficulty. That this operation requires a thorough knowledge of the anatomy of the parts, is true; and this can only be acquired by repeated dissections.

“The nearest successful case,” says Mr. Guthrie, “to the operation thus recommended, was performed by Dr. Keith, of Aberdeen”:

E. Kennedy, aged 25, accidentally swallowed a pin, the head of which could be felt below and behind the left tonsil, covered by the lining membrane of the pharynx; it could not be extracted by any attempt made for its removal. The membrane was snipped by a pair of probe-pointed scissors, to expose the head of the pin. This was followed by the discharge

of mouthfuls of arterial blood, and it was evident that the internal carotid artery had been injured. Pressure on the common carotid stopped the bleeding, and the operation of placing a ligature on the internal carotid was effected in the following manner: The patient's head being supported by a pillow, her face was turned toward the right shoulder, when an incision was made from below the ear along the ramus of the lower jaw to below its angle. No hemorrhage occurred, and the vessel was speedily exposed and secured by a double ligature passed under it, with less difficulty than the depth of the vessel would lead one to expect. One ligature arrested the flow of blood, and the other was therefore withdrawn. The woman recovered, without any return of the bleeding. Dr. Keith, aware of the necessity for tying the other end of the artery, if it should bleed, watched the case day and night until the period of danger had passed away. The pin gave no trouble, until felt by the patient as about to go down the oesophagus, which it did, to her great satisfaction and relief from further anxiety.

There are many peculiarities in this case:

1st. "Pressure on the common carotid stopped the bleeding." It will be seen, presently, that *ligature* of the common carotid did not stop the bleeding; and as pressure did in Dr. Keith's case, it is amazing that he did not at once throw a ligature around that vessel, before attempting to ligate the internal carotid.

2nd. But, stranger still, after having thrown a double ligature around the internal carotid, he could afford to withdraw one, as one ligature arrested the flow of blood at that time.

There is no little confusion in the narrative of this operation. The author says "an incision was made from below the ear along the ramus of the lower jaw to below its angle. No *hemorrhage occurred*, and the vessel was *speedily* exposed and secured by a *double* ligature passed under it." We have caused these words to be printed in italics. John Hunter would have expected this procedure to succeed, and it did succeed, but we are sure no surgeon of to-day would trust it.

Mr. Guthrie says: "With what fairness can this operation, thus done on one side of the neck, at the distance of two inches, the other side remaining sound, be considered similar to that of Mr. Hunter, done on the thigh, for a wound in the calf of the leg, at the distance of perhaps twenty inches, with

all the intervening collateral branches perfectly sound? * *
 * One ought not to be compared with the other, although it is done, and thus the subject is mystified to all those who do not understand it thoroughly."

The law laid down by Mr. Guthrie for controlling the hemorrhage from a wound of the internal carotid artery, is to reach the vessel from without, and place a ligature above and below the wound. He admits the difficulty of the operation; nay, he says in italics, "*I am willing, for the present, to consider it nearly impracticable to tie the internal carotid safely from the outside of the neck, at the part wounded, without great anatomical knowledge.*"

Mr. Guthrie gives the following case in illustration of the soundness of this doctrine:

M. S —, a female, aged 53, was admitted into the Westminster Hospital, with a large movable tumor in the neck, under the sterno-mastoid muscle of the right side. An operation having been commenced for its removal, the tumor was found to be of a more than doubtful character, and to dip down between and behind the great vessels of the neck. In the course of the operation, the external carotid was opened a little above its bifurcation, and a ligature was applied on the common carotid. The bleeding was not in the least arrested; a ligature was then placed on the external carotid, above the hole in the artery, which still continued to pour out blood; a third ligature was now put upon the internal carotid, with no better success. A fourth ligature was then applied on the external carotid, below the hole in it, including the superior thyroid, which was then given off at that part; after which the bleeding ceased, and never returned. Three ligatures came away in three weeks; the fourth remained during five weeks. The patient recovered from the operation, but the tumor grew again, and the woman died exhausted at the end of six months.

On examination after death, the arteries referred to were found to be obliterated for some distance above and below the parts injured.

The utter inefficiency of everything but the two ligatures, the one immediately above, the other immediately below the part opened, could not be more distinctly proved, if a case were even invented for the purpose; and the fact could not be more satisfactorily shown that in every case of wounded—not aneurismal—artery in the neck, one ligature should be applied above, and another below the opening in the injured vessel, and not one alone on the common trunk, even if that should be the part injured.

We are compelled to admit Dr. Keith's case, because he has recorded it, and Mr. Guthrie quotes it. This Mr. Guthrie

does with an incomprehensible introduction. It is clear, as far as one can go in that direction, that Dr. Keith overturns the doctrine of Mr. Guthrie, for this gentleman relied upon a single ligature; for although he had thrown two under the artery, he only tied one, withdrawing the other. Yet Mr. Guthrie says, with a *naivete* and incomprehensibility alike deliciously cool, "the *nearest successful case to the operation here recommended, was performed by Dr. Keith,*" &c. The italics are ours. The *case performed by Dr. Keith* is only remarkable for contradicting the rule of Mr. Guthrie, and nearly the entire mass of experience of surgeons since then.

The case referred to by Dr. Sands as the only successful one before his own, ought not to be insisted on as a case at all. It is given by Mr. Guthrie as follows:

Dr. Twitchell, of Keene, N. H., United States, says a soldier, in a sham fight, in 1807, received a wound, from the wadding of a pistol, on the right side of the head, face, and neck, which was much burned. A large wound was made in the mouth and pharynx; nearly the whole of the parotid gland, with the temporal, masseter, and pharyngeal muscles, was destroyed. The neighboring bones were shattered, and the tongue injured. The hemorrhage was not copious, although the external carotid and its branches were divided.

Ten days after the accident, the sloughs had all separated, and left a large circular aperture of from two to three inches in diameter, at the bottom of which might be seen distinctly the internal carotid artery, denuded from near the bifurcation of the common trunk to where it forms a turn to enter the canal in the temporal bone. Directly on this spot there was a dark speck, of a line or two in diameter, which suddenly gave way while Dr. Twitchell was in the house. With the thumb of his left hand he compressed the artery against the base of the skull, and effectually controlled the hemorrhage. The patient fainted.

"As soon as he recovered," the doctor says, "I proceeded to clear the wound from blood, and having done this I made an incision with a scalpel downward, along the course of the artery, to more than an inch below the point where the external branch was given off, which, as stated above, had been destroyed at the time of the injury. Having but one hand at liberty, I depended upon the mother of the patient to separate the sides of the wound, which she did, partly with a hook, and occasionally with her fingers. At length, partly by careful dissection, and partly by using my fingers and the handle of the scalpel, I succeeded in separating the artery from its attachments; and, passing my finger under it, I raised it up suffi-

ciently for my assistant to pass a ligature around it. She tied it with a surgeon's knot, as I directed, about half an inch below the bifurcation."

Dr. Twitchell removed his thumb and sponged away the blood, not doubting that the hemorrhage was effectually controlled; but, to his surprise and disappointment, the blood immediately began to ooze from the rupture in the artery, and in less than ten minutes it flowed with a pulsating jet. He compressed it again with his thumb, and began to despair of saving his patient, but resolved to make another attempt.

Raising his thumb, he placed a small piece of dry sponge directly over the orifice in the artery, and renewed the compression till a rather larger piece of sponge could be prepared. He placed that upon the first, and so went on, pressing the gradually enlarged pieces obliquely upward and backward against the base of the skull, till he had filled the wound with a firm cone of sponge, the base of which projected two or three inches externally. He then applied a linen roller in such a manner as to press firmly upon the sponge, passing it in repeated turns over the head, face, and neck.

On the 30th of December, the patient was discharged cured, several fragments of bone and two teeth from the upper jaw having been cast off. Some deformity remained, in consequence of the depression on the side of the face.

Dr. Twitchell tied the common carotid, not the internal carotid; and surgeons now know that he might have spared himself the anxiety and his patient the hazard from a prolonged operation to ligate the common carotid—of no possible benefit, and might have successfully resorted to the sponge at first, possibly, as he did at last. This case has certainly nothing to do with the ligation of the internal carotid artery, which was *not* ligated.

This case is referred to by the contributor to the *New York Medical Journal* as the only successful one that preceded his own—his being the second. If medical records exhibit but this case before that of Dr. Sands, this gentleman might make a very plausible show of priority. But the mountain rill, which, in its native fastnesses, gently steals along beneath the cast-off garniture of forest denizens, with here and there breathing-holes, to dally with and flash back the intruding sun-light, to lose itself in a more pretentious stream, and reach the sea by proxy, modestly asserts its rights. Undoubtedly the most brilliant operation for the arrest of hemorrhage from a wound of the internal carotid artery, ever achieved, occurred

in the amphitheatre of our Medical College, and is recorded in the *Nashville Journal of Medicine and Surgery* for March, 1871, as follows:

Traumatic Aneurism of the Internal Carotid Artery, the result of a Puncture—Ligation of the Internal Carotid at the Seat of the Injury. By W. T. BRIGGS, M. D., Professor of Principles and Practice of Surgery in the University of Nashville.

Thomas B—, aged 23 years, was admitted into St. Vincent's Hospital on the 22nd of February last [1871], on account of a tumor in the left parotidean region. The tumor was as large as the closed hand, circumscribed—smooth upon its surface, with a strong expansive pulsation when the hand was pressed on it. The swelling was lessened by pressure on the common carotid, and a loud *bruit* was heard when the ear was applied. Upon the anterior part of the swelling was a wound half an inch in width, in a state of almost complete cicatrization. The patient complained of great pain and tension in and around the tumor, with difficulty of swallowing. He was feeble, with frequent quick pulse, pallid countenance, no appetite, and was very apprehensive about his condition.

Upon inquiry it was learned that, about six weeks previous, in an affray, he had received a stab at the point now marked by the cicatrix, which had bled freely at first, but was easily checked by pressure of the hand. On the following day his wounds were dressed by Dr. Sneed, with the compress and bandage. In a few days afterwards, hemorrhage occurred, which was arrested before Dr. S. reached him.

Several times, during the next few weeks, the hemorrhage recurred, but was each time easily restrained by pressure. Two weeks since, the doctor recognized the formation of the aneurismal tumor, and called me to his assistance.

We thought it best, at the time, to try the effect of continued pressure over the tumor, but finding that it was enlarging daily, and the skin becoming thinner, especially at one point, it was determined that an operation was imperatively demanded. The patient was therefore admitted into the hospital, as before mentioned, and the next morning was appointed for the operation.

Fully aware of the gravity of the case, and the great responsibility involved—two lives, possibly, depending on the issue,—I sought the assistance of several of my professional friends, to whom I am much indebted for very valuable aid. In consultation, it was determined to make an incision into the tumor, turn out the clots, and try to ligate the artery wounded; and if the artery was so deeply seated that it could not be found, or reached, to ligate the common carotid.

The patient was brought into the amphitheatre of the College, before the class, and anesthetized with ether. Having been placed on his back, with his head turned toward the opposite side, I pushed the knife into the most prominent part of the tumor, and followed it quickly with my finger, so as to prevent the loss of blood. I then searched through the sac for the wound of the artery. I failed to satisfy myself of the position of the wound, but felt the pulsation of a large vessel, which I supposed to be the external carotid. Keeping my finger steadily on this vessel, I enlarged the opening into the sac upward and downward. Immediately large clots were discharged, followed quickly by a furious gush of arterial blood, which I arrested by stuffing compressed sponge into the cavity. Withdrawing the sponge, one part at a time, I attempted to get my finger on the wound of the vessel, which, after another terrific gush of blood, I succeeded in doing. It was not, however, until my finger had passed its full length into the wound, and was pressing against the vertebral column, that the effusion of blood was checked. In view of the depth of the vessel, and its confined position between the ramus of the jaw and mastoid process, I again stuffed the cavity of the sac with compressed sponge, and proceeded to ligate the common carotid artery, at the point of election, in the usual way.

On the removal of the sponge from the wounded artery, the hemorrhage was as violent as before. I plunged my finger into the cavity of the sac, and at once arrested it. Dr. V. S. Lindsley then compressed the opposite common carotid, so as to cut off the blood from that source; but the effusion of blood, when the pressure of the finger was relaxed, again returned.

Satisfied that nothing but a ligature on each side of the wound in the artery would arrest the flow of blood, I held my finger on the aperture of the vessel while I divided all the tissues between the two incisions I had already made, making a wound fully seven inches long. The edges of the incision were held apart with curved spatulae. The angle of the jaw was found very much in the way, and the propriety of sawing through it, so as to turn it aside, was considered; but I concluded to make the attempt to apply the ligatures first, without. The forefinger of the left hand was kept on the opening of the wounded artery, while the tissues on each side were divided, by scratching through with the handle of a knife, held in the right hand. The artery-needle, armed with silk ligature, was then, guided by the finger that rested on the artery, passed around it, and it was drawn out so far as to show that nothing else was taken up with it, when the needle was withdrawn, and the ligature tied on the distal side of the opening. I could now remove my finger with impunity. Another ligature was applied on the proximal side of the wound in the artery. Between the two ligatures, a small circular opening, made by the point of the knife, was found on the side of the artery, through which the blood had issued. Several smaller vessels, which bled when all pressure had been removed, were ligated, and the clots of blood sponged out, and we could now see what had been done.

In the upper part of the wound, the parotid gland had been spread out by the aneurismal sac, so that it could not be recognized; but at its lower part, it had been divided through its middle; of course the branches of the facial nerve had been divided, causing paralysis of the muscles supplied by it. In the bottom of the wound the styloid process could be seen and felt, while just anterior and internal to it, the ligatures were seen coming from the artery. All the parts around were covered over with the smooth serous-looking membrane that lined the sac.

The ligatures having been brought out, the extensive wound was brought together with the silver suture and adhesive plaster.

The patient bore the protracted and tedious operation very well, and has not had, up to the present time (the tenth day), an unpleasant symptom. He suffers no pain, sleeps well, has appetite, etc. etc.

These cases of traumatic aneurism are the most troublesome and responsible with which the surgeon has to contend. The doubt as to the artery wounded, the almost inevitable hemorrhage which occurs upon opening the sac, and the danger of the patient dying on the table, causes him to wish that they had fallen into some other hands than his. In the case under consideration, it was impossible to say what arterial branch had been punctured; but, from the size of the tumor, and from its strong pulsation, it was presumed to be one of considerable magnitude.

Preparations were made to meet every emergency, yet the hemorrhage, upon opening the sac, was appalling, and many of the students left the amphitheatre under the impression that the patient would die on the table.

The arterial lesion proved to be a puncture in the internal carotid, and the ligation of the common carotid had no effect, even to moderate the current of blood passing out. Neither did perfect compression of the opposite common carotid control the hemorrhage, though it did lessen it to some extent. The vertebrals still carried enough blood into the terminal branches of the internal carotids to have given rise to a fatal recurrent hemorrhage. The patient's life depended on placing ligatures on the artery above and below the wound. Guthrie has immortalized himself by proving that, in wounded arteries, hemorrhage will recur even after the ligation of the main trunk, whenever the collateral circulation is sufficient to maintain the life of a part, and that the only prevention is the application of a ligature on each side of the wound in the vessel. This is indeed the golden rule, to which there are very few exceptions. When it is *impossible* to reach the wounded artery, we *have* to depend on the Hunterian operation, but it is a poor dependence. Yet we find that many modern works on Surgery still advise the Hunterian operation in traumatic aneurisms.

In the article on Traumatic Aneurism, in "Holmes' Surgery," written by himself, he says: "If, therefore, the tumor be deeply seated, and it would be difficult to expose the vessel, as it leads into it, no hesitation need be entertained in trusting to the Hunterian method; while if (as is usually the case at the bend of the elbow) the tumor, and the artery on which it is

seated, be superficial, the old operation of opening the sac, and tying both ends of the vessels, offers no special difficulties, and is certain to succeed." * * * "Still, the great majority of traumatic aneurisms have yielded to the proper application of pressure, and few of those which have not done so, are known to have resisted the Hunterian operation. It is only in cases in which the tumor is superficially seated, and the operation comparatively easy and bloodless, that the majority of surgeons would prefer the old operation."

Erichsen, in his most excellent work on Surgery, advises, in diffused traumatic aneurism, laying open the tumor, and ligating the artery above and below the wound in it; but when there is a circumscribed aneurism, more especially when the sac is formed by dilatation of the cicatrix in the external coat and sheath of the artery, he recommends ligature, or compression of the artery leading to the sac. Many other authors advise the application of the ligature above and below the aperture in the vessel, if it can be *easily* done, but intimate that the Hunterian method will be sufficient, if it cannot.

My experience sustains the teachings of Guthrie, that there is no assurance against hemorrhage in traumatic aneurism, whether diffused or circumscribed, except by a ligature above and below the wound in the vessel. A case which came under my observation during last summer will serve as an illustration.

A young man let his knife, which he held open in his hand, fall, the point entering about two inches below Poupart's ligament, directly over the Sartorius muscle, passing obliquely downward and inward to the extent of an inch or more. A gush of arterial blood escaped at the time, but hemorrhage was arrested by pressure, and the wound healed promptly. In a few days afterwards, an aneurismal tumor formed at the point of injury to the artery, as large as a goose egg, and perfectly circumscribed.

Four weeks after the injury, the skin over the tumor becoming very thin, I was summoned to operate. Making an incision over the tumor, from the upper to the lower part, the femoral artery was exposed just as it entered the sac. I placed a ligature on it at that point. Every physician present was satisfied that there would be no hemorrhage when the sac was opened. To prove to them that there would be considerable hemorrhage from the lower end of the artery, I placed a tourniquet on the limb below the wound, loosely, with directions to my assistant to tighten the moment I made an incision into the sac. As soon as I did so, a few clots were discharged, and then a stream of blood was thrown three or four feet in height, which was promptly arrested by screwing up the tourniquet, when I proceeded to sponge out the sac and place a ligature on each side of the puncture in the vessel. The patient was well in a short time.

I will allude to another case, which occurred in my practice several years since. A gentleman received a gunshot wound in the inner and upper part of the thigh, the ball ranging inward toward the femoral artery. In a few

days, a circumscribed aneurism formed just below Poupart's ligament. I ligated the external iliac artery. The tumor was very much diminished in size, and its pulsation almost checked.

Four weeks afterwards, the sac having inflamed and suppurated, it opened spontaneously, and such a discharge of blood followed as reduced the patient to an extreme condition before the nurse, who had been fully instructed, could arrest it by pressure. When a free incision had been made into the sac, the wound of the artery was found, after a tedious search, and a ligature applied to the lower end of the artery. He recovered after an illness of two months or more.

In the present case, I applied a ligature to the common carotid because it did seem almost impossible to put a ligature on the wounded artery before the patient would bleed to death. Finding, however, that it did not control the hemorrhage, I was compelled, of necessity, to ligate the vessel on on each side of the wound, which was effected only after great difficulty.

It will be perceived that Dr. Briggs made no work for himself, but solely remedied the disasters from other sources. Dr. Sands made a splendid display of surgical ability, that commends him, as an operator, to his city, his state, and his country at large; we are only sorry that we cannot commend, also, his research for the last three years. He finds Twitchell, as far back as 1807, who did not tie the internal carotid, but cannot find Briggs, his contemporary, only as far back as 1871, who did! We know that the *Nashville Journal* containing Dr. Briggs' case is in every medical library of any importance in New York. We witnessed this operation, and shall never forget our feelings of triumph when, after the last ligature, the sponging left the wound dry, the surgeon, physically and mentally exhausted, looked up for the first time since the commencement of the operation, and exclaimed, "SAVED!" The man operated on is now, three years after the operation, well, and daily on our streets.

Dr. Bartlett, author of *The Fevers of the United States*, having never seen yellow fever, declares that he feels himself all the more competent to give a faithful history of it. We, the Senior Editor of this Journal, and no surgeon, will not insist that we are the more competent umpire in surgical disputes, but we insist that we endeavor to place medical matters in controversy fairly before our readers.

In summing up, Dr. Sands says: "The case that I have reported is the only one, so far as I am aware, in which a lesion of the internal carotid has been treated by the application of a double ligature to the injured vessel, one on the proximal and the other on the distal side of the bleeding vessel." This was in October, 1872. Our colleague did this precise thing in February, 1871—eighteen months before. Dr. Sands' researches back of Dr. Briggs seem quite exhaustive and reliable. If so, then Dr. W. T. Briggs is the first surgeon, from the institution of Surgery, to treat a lesion of the internal carotid by the application of a double ligature to the injured vessel, one on the proximal and the other on the distal side of the bleeding vessel.

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